



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF APPEALS

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APPLICANT: SERRA OBIOL, Ramon

SERIAL NO.: 09/463,914

ART UNIT: 3724

FILED: February 1, 2000

EXAMINER: Flores Sanchez, O.

TITLE: SYSTEM FOR FIXING ROTARY CUTTING DIES IN MACHINES FOR DIE  
CUTTING LAMINAR MATERIAL

APPLICANT'S BRIEF IN SUPPORT OF APPEAL

Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

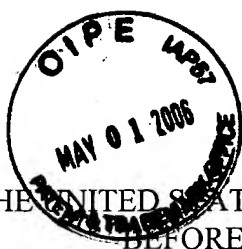
Sir:

This is an appeal from the Final Rejection of Claims 50-57. Claims 1-49 are no longer  
pending because these claims were canceled in a previous amendment

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CERTIFICATE OF MAILING UNDER 37 CFR 1.8(a)

Commissioner for Patents  
P. O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I hereby certify that the attached correspondence comprising:

APPEAL BRIEF

is being deposited with the United States Postal Service with sufficient postage as first class mail  
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on 4-26-06.

Respectfully submitted,

4-26-06  
Date

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#### REAL PARTY IN INTEREST

The person named in the caption, Mr. Ramon SERRA OBIOL, is the inventor only. The Assignee, Comercial Industrial Maquinaria Carton Ondulado S.A. (CIMCO S.A.), is the real party in interest in the present appeal.

#### RELATED APPEALS AND INTERFERENCES

There are no other related appeals or interferences known to Applicant which will directly affect or be directly affected by or have a bearing on the Board's decision in the present appeal.

#### STATUS OF CLAIMS

Originally, Claims 1 - 11 were filed in this case, having independent Claim 1 as a national stage application. The 35 U.S.C. §371 requirements were completed on February 1, 2000.

After the first Office Action of December 8, 2000, Applicant canceled original claims, Claims 1-11, and substituted Claims 11 -21. The new independent Claim 11 corresponded to the original independent claim while incorporating intervening dependent claims. There was a minor error because original Claim 11 was overwritten as the new base independent claim.

After a Final Action and Request for Continued Examination on May 8, 2001, Applicant canceled Claims 11-21, and substituted Claims 22-32. The new independent Claim 22 incorporated more limitations and corresponded to the previously pending independent claim, Claim 11.

After the Third Office Action on October 23, 2001, Applicant canceled Claims 22-32, and substituted Claims 33-41. The new independent Claim 33 incorporated more limitations and corresponded to the previously pending independent claim, Claim 22. Applicant made additional remarks regarding the prior art without amendments to the claims.

The Application was lost in the U.S. Patent and Trademark Office for almost three years because of the conversion into an image file wrapper and misplacing the Amendment by the U.S. Patent and Trademark Office. Applicant filed a responsive amendment on January 26, 2002, and the U.S. Patent and Trademark Office was not able to enter this amendment until August 5, 2003. Applicant made inquiries to the Examiner to check the status of this application to secure the eventual re-construction of this file. An Office Action was eventually issued over one year later on January 13, 2005.

Another Final Action and Request for Continued Examination on January 13, 2005, was finally received. In response, Applicant canceled Claims 33-41, and substituted Claims 42-49. The new independent Claim 42 incorporated more limitations and corresponded to the previously pending independent claim, Claim 33.

After the Fifth Office Action on June 15, 2005, Applicant canceled Claims 42-49, and substituted Claims 50-57. The new independent Claim 50 incorporated more limitations and corresponded to the previously pending independent claim, Claim 42.

After another Final Action rejecting Claims 50-57, the present appeal was filed. Claims 1-49 were canceled in previous amendments. Claims 50-57 are the pending claims at issue in the present appeal.

#### STATUS OF AMENDMENTS

No amendments have been filed subsequent to the Final Rejection of January 26, 2006.

## SUMMARY OF CLAIMED SUBJECT MATTER

The present invention discloses a rotary die cutter in a die cutting machine for cutting laminar material. The system has a fixing means between the die and a die-holder surface or cylinder around which the die is arranged. The fixing means include a plurality of bolts actuated by an actuator housed inside a hollow body fixed to the die-holder cylinder in order to provide for a rapid fixing of the rotary die to the die-holder cylinder.

## GROUND OF REJECTION TO BE REVIEWED ON APPEAL

In the Final Office Action of January 26, 2006, it was indicated that Claims 50-52, 54 and 56 (sic) were rejected under 35 U.S.C. §103(a) as being obvious over the Quinlan patent in view of the Katz patent. Claims 53-55 were also rejected under 35 U.S.C. §103(a) as being obvious over the Quinlan patent in view of the Katz patent. Claim 57 was rejected under 35 U.S.C. §103(a) as being obvious over the Quinlan patent in view of the Katz patent and in further view of the Harrison patent.

## ARGUMENT

### **I. OVERVIEW**

Applicant amended the independent claim to recite the limitation of a working means with a plurality of fluid dynamic cylinders, each acting independently of each other in the two halves of the cutting die machine. Thus, the invention of Claim 50 is not made obvious by the combination of prior art. Furthermore, the prior art combination should be re-considered because of the hindsight analysis used to reject the claims.

## **II. THE INVENTION IS NOT MADE OBVIOUS BY THE PRIOR ART COMBINATION**

In determining the propriety of the Patent Office's position as to obviousness in the first instance, it is first necessary to ascertain whether or not the referenced teachings would appear to be sufficient to one of ordinary skill in the relevant art knowing the reference before him to make the proposed substitution, combination, or other modification. In re Lintner, 458 F.2d 1013, 1016, 173 U.S.P.Q. 560 (C.C.P.A. 1972). A conclusion of obviousness may not be based on an impermissible hindsight reconstruction of the art. Application of Van Wanderhim, 378 F.2d 981 (C.C.P.A. 1967). It is insufficient to show merely that each separate element of a claimed invention can be found in one or various prior art references. Canadian Ingersoll-Rand Co. v. Peterson Products, Inc., 223 F.Supp. 803, 139 U.S.P.Q. 61 (N.D. Cal. 1963). There should be some teaching, or at least suggestion, in the prior art that the individual elements can, or should, be combined as claimed. In re Regel, 526 F.2d 1399, 1403, 188 U.S.P.Q. 136 (C.C.P.A. 1975).

### **A. ONE SKILLED IN THE ART WOULD NOT COMBINE THE PRIOR ART QUINLAN PATENT AND KATZ PATENT**

The present invention was intended to be an improvement over the prior art techniques for applying cutting dies to support cylinders. This invention improves the old technique in which separate screws have to be applied to each of the cutting dies to secure the cutting dies within the threaded connection formed in the support cylinders. Specifically, in the original specification under the "Background", it was stated that:

At present, the rotary cutting dies are fixed on the cutting die support by means of screws that are coupled to the corresponding screw holes made on the surface of cutting die support cylinder.

This fixing system has the main inconvenience that it is excessively slow, as a considerable number of screws have to be

placed.

The prior art Quinlan patent discloses this known prior art machine with a cutting die support cylinder, a cutting die, holes, and a fixing means of separate screws in the surface of the cylinder. There is no suggestion that the known rotary cutting die of the Quinlan patent should be combined with the fixing means of the Katz patent in order to make the present invention obvious.

### **1. Different purposes and functionality**

The Quinlan patent specifically describes this prior technique for joining the cutting die onto the cutting die support cylinder. Specifically, it was recited in column 5, lines 7 - 20 that:

In Fig.4, the fastening means 21 is shown as being a conventional flat-head fastener having a head portion 28 adapted to bear against die board convex surface 19, and having a threaded shank portion 29 passed through slot 20 and engaged with die drum tapped hole 14. Hence, the fastening means 21 may be selectively loosened to permit longitudinal movement of die board 16 relative to die drum 12, and selectively tightened to securely hold the die board 16 to the die drum 12 at a selected position. Persons skilled in this art will recognize that if it is desired to shift the die board 16 along the die drum 12 a greater distance than that permitted by the longitudinal extent of slots 20, before fastening means 21 may be relocated to another set of die drum holes 14 to permit such desired die board movement.

As such, the prior art Quinlan patent simply recites the known prior art. In other words, in order to fasten the cutting die to the cutting die support cylinder, one has to apply the various flat-head fasteners into the separate screw holes in a mechanical manner. The cutting die is attached to the cylindrical surface without regard to the ends of the cylinder. This process takes an excessive amount of time and is very inconvenient because the different shapes of cutting dies require individual manipulation of the bolts in the holes across the cylindrical surface, as was recited in the



"Background" portion of the present specification. The Quinlan patent appears to only disclose known prior art to that of the present invention.

In contrast, the Katz patent discloses a fluid dynamic spring-mounted bolt which is movable between a retracted position and an extended position. When the pneumatic valve is operated, the bolts will extend outwardly of the machine spindle. As a result, the tool can be rotated such that the slots are separated from the bolts. The bolts will extend outwardly so that a new tool can be placed thereon in a quick and efficient manner. The cylinder is then actuated to retract the bolts so as to secure the machining disc onto the machining spindle. The bolts extend from an end of the cylinder, and not the surface.

## **2. The combination should be re-considered**

Fundamentally, Applicant respectfully contends that one having ordinary skill in the art of the Quinlan patent would not turn to the teachings of the Katz patent except through a hindsight reconstruction of the present invention. The common problem of connecting a blade to a support holder does not make the Quinlan patent and the Katz patent analogous. The blades are different between the rotary tools of the prior art combination; the blades are placed in significantly different locations; and the fixing means for the blades require different controls and coordination.

The Quinlan patent addresses the particular difficulties of fixedly attaching a cutting die to the curved cylindrical surface of the two halves of the rotary cutting die machine. The spacing and shape and levels of the cutting die on the cylindrical surface require special consideration and flexibility in the actuation and control of each bolt. For example, the cutting die could be L-shaped such that only particular bolts are active. The holes and bolts throughout the surface of the cylinder will not be treated uniformly. In contrast, the Katz patent requires coordinated bolts at the end of

the cylinder because the rotary tool is attached flushed to the end of the cylinder. The end is a flat planar surface, and the bolts are extended and retracted axially from the rotary tool spindle and from this planar surface. The bolts are coordinated and linked on the end surface of the cylinder so that the rotary tool can easily be removed and changed. If one bolt acts independently from the other bolts, then the tool will not be able to be attached to the end of the cylinder or the tool will not be able to be removed from the end of the cylinder.

Although both patents relate to attachments to rotary tools, the problems addressed by the two patents address different problems for different portions of different types of rotary tools. The Quinlan patent utilizes mechanical bolts and/or screws for securing the cutting die to the surface of the cutting cylinder. The Quinlan patent has some bolts remaining in the retracted condition when a particular type of cutting die is secured to other bolts. The Katz patent is directed to the quick removal of machining discs at the ends of a cylinder, and it is difficult to see how one skilled in the art would associate need for coordinated planar alignment of the bolts and holes in the Katz patent with the required flexibility of the bolts and holes on the curved surface of the Quinlan patent.

On this basis, Applicant respectfully contends that the teachings of the Quinlan patent would not cause one with ordinary skill in the art to look for technology associated with the Katz patent. Applicant respectfully contends that the combination of these references are merely a hindsight analysis and, hence, should not make obvious the teachings of the present invention.

Furthermore, Applicant notes that the Quinian patent was first recited in the rejection of fifth rejection on June 15, 2005 as a primary reference. There have now been five (5) Official Actions and over six (6) years associated with the present application. Applicant is specifically concerned as to why a such a pivotal reference has not been recited until the Fifth Office Action herein. Quite

clearly, the failure to recite such a prior art patent is evidence, in itself, of the non-obviousness of the present combination.

**B. THE COMBINATION OF THE PRIOR ART FAILS TO TEACH ALL ELEMENTS OF THE INVENTION AS NOW CLAIMED**

Although it is admitted that prior art does show features of the present invention, there is no disclosure of the invention as now claimed. There is nothing in the prior art combination that would reveal the "working means comprising a plurality of fluid dynamic cylinders each acting independently of each other in said two 180° halves" achieved by the present invention.

Relative to the present claims, Applicant notes that there are no teachings in these prior art combination that the fluid dynamic cylinders act independently of each other. Quite clearly, in the Katz patent, each of the bolt-receiving fluid-dynamic cylinders must operate in concert so that each of the bolts extends outwardly simultaneously in a coordinated manner. There would be no way to make the operations independent of each other. The bolts are circumferentially aligned in the same plane such that the cutting tool cannot be placed flush against the cylinder without coordination. Independent bolts in the Katz patent would result in an uneven surface, rendering the cutting tool ineffectual and dangerous. The reference to "the lifting off or the movement of the clamping members may also be effected by a plurality of pistons" has no relation to the independence of the cylinders. The fact that more than one piston is used does not address the property of independent control of each cylinder. Multiple pistons can be used for a variety of reasons, such as additional pressure and even distribution of force on the bolts, such that one skilled in the art cannot conclude that the bolts of the Katz patent function independently from each other. Furthermore, the Katz patent discloses a rotary tool, and not a rotary die cutting machine, such that more than one cylinder

is not required for the invention. As such, the Katz patent does not disclose independent cylinders.

The Quinlan patent does not disclose independent cylinders either because the rotary cutting die machine is silent on this issue. There is no suggestion of any improvement needed in this area, and the mere recitation of the prior art rotary cutting die machine discloses nothing about the improved fixing means of the present invention and limitation proposed in the present invention.

Additionally, there is no teaching in either of the Quinlan or Katz patents that the bolt of the fixing means remain in the retracted position when the bolt is obstructed from moving from the extended position. Fundamentally, for the device associated with the Katz patent to operate properly, all of the bolts must be extended together so as to allow for the attachment or removal of the disc-shaped machining tool. The present invention allows for the retention of the bolt within the hole where the hole associated with the cutting die does not align with a particular bolt. As such, the prior art combination would fail to show the limitation of the "plurality of dynamic cylinders each act independently of each other" in the two 180° halves of the cutting die support cylinder. On this basis, Applicant respectfully contends that independent Claim 50 is patentably distinguishable from the prior art combination.

It is important to note that the present application is a national stage application of an international patent application. The national stage applications in various countries have already determined and validated the patentable subject matter of the present application, such that multiple patents in other countries have issued. Copies of these allowed patents are attached hereto.

Based upon the foregoing analysis, Applicant contends that independent Claim 50 is now in proper condition for allowance. Additionally, those claims which are dependent upon Claim 50 should also be in condition for allowance. Reconsideration of the rejections and allowance of the

claims at an early date is earnestly solicited. Since no new claims have been added above those originally paid for, no an additional fee is required.

### III. SUMMARY

Based upon the foregoing analysis, it is Applicants' contention that Claims 50-57 of the present invention are patentably distinguishable from the prior art combinations.

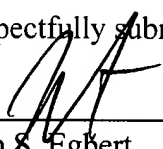
The foregoing Brief is intended to assist the Board of Appeals in examining the application and, in the course of explanation, may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not considered to be exhaustive of the facets of the invention which render it patentable, being only examples of certain advantageous features and differences which Applicants' attorney chooses to mention at this time. The required fee for transmittal of the appeal brief is enclosed herewith.

Reconsideration of the application, as amended, and allowance hereof are respectfully requested.

4.26.06  
Date

Customer No. 24106

Respectfully submitted,

  
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## CLAIMS APPENDIX

50. An apparatus for die cutting laminar material comprising:

a cutting die support cylinder having a cylindrical outer surface, said cutting die support cylinder having a two 180° halves;

a cutting die having a curved shape, said cutting die having a curved inner surface conforming to said cylindrical outer surface of said cutting die support cylinder, said cutting die having a plurality of holes formed therein so as to extend from said curved inner surface to an exterior surface of said cutting die; and

a fixing means for securing said cutting die to said cutting die support cylinder, said fixing means comprising:

a bolt having a shank and a head, said head having a larger area than an area of a cross-section of said shank in parallel relation to said head; and

a working means housed within a hollow body affixed to said cutting die support cylinder, said working means operatively connected to said bolt for moving said bolt from a retracted position to an extended position, said head of said bolt extending outwardly of said cutting die support cylinder through one of said plurality of holes of said cutting die when in said extended position, said working means being a dynamic fluid cylinder, said head of said bolt being secured to said cutting die when in said extended position, said working means comprising a plurality of fluid dynamic cylinders each acting independently of each other in said two 180° halves, each of said plurality of fluid dynamic cylinders having a spring cooperative with said bolt such that said bolt remains in said retracted position when said bolt is obstructed from moving to the extended position.

51. The apparatus of Claim 50, said dynamic fluid cylinder being a pneumatic cylinder.
52. The apparatus of Claim 50, said dynamic fluid cylinder being a hydraulic cylinder.
53. The apparatus of Claim 50, said plurality of holes of said cutting die being quincuxes, said head of bolt being resiliently retained in one of said quincuxes when said bolt is in said retracted position.
54. The apparatus of Claim 50, said cutting die support cylinder having a plurality of threaded holes formed thereon, said cutting die having respective fasteners received by said plurality of threaded holes so as to secure said cutting die to said cutting die support cylinder.
55. The apparatus of Claim 55, said plurality of threaded holes having respective quincurixes formed at said surface of said cutting die support cylinder.
56. The apparatus of Claim 50, said cutting die being centered on said cutting die support cylinder.
57. The apparatus of Claim 56, said cutting die support cylinder having a circumferential stop and an axial stop, said cutting die having an edge abutting said circumferential stop and a centering guide receiving said axial stop.

## EVIDENCE APPENDIX

1. European Patent No. 1 008 425
2. Canadian Patent No. 2 298 672
3. Spanish Patent No. 2 155 334





OFICINA ESPAÑOLA DE  
PATENTES Y MARCAS

ESPAÑA



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⑬ Int. Cl.<sup>7</sup>: B26D 7/26

B26F 1/44

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A1

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⑯ Fecha de publicación de la solicitud: 01.05.2001

⑰ Fecha de publicación del folleto de la solicitud:  
01.05.2001

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⑳ Agente: Campo Castel, Domingo del

㉑ Título: Sistema para la sujeción de troqueles rotativos en máquinas troqueladoras de material laminar.

㉒ Resumen:  
Sistema para la sujeción de troqueles rotativos en máquinas troqueladoras de material laminar.  
Sistema para la sujeción de troqueles (1) en máquinas troqueladoras de material laminar, con medios de sujeción entre el troquel (1) y un cilindro o superficie porta-troquel (2) alrededor del cual está dispuesto el troquel (1), en el que los medios de sujeción comprenden una pluralidad de pernos (3) accionados por un dispositivo accionador (5), alojado en el interior de un cuerpo hueco (8) sujeto al cilindro porta-troquel (2). Con ello se consigue una rápida sujeción del troquel rotativo al cilindro porta-troquel.

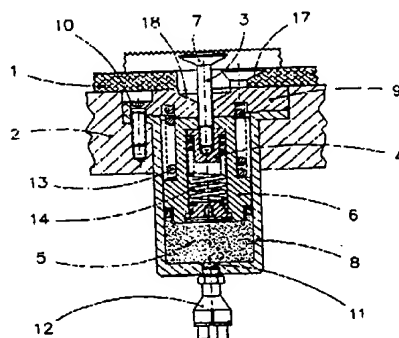
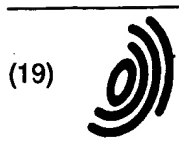


Figura 1.

ES 2 155 334 A1



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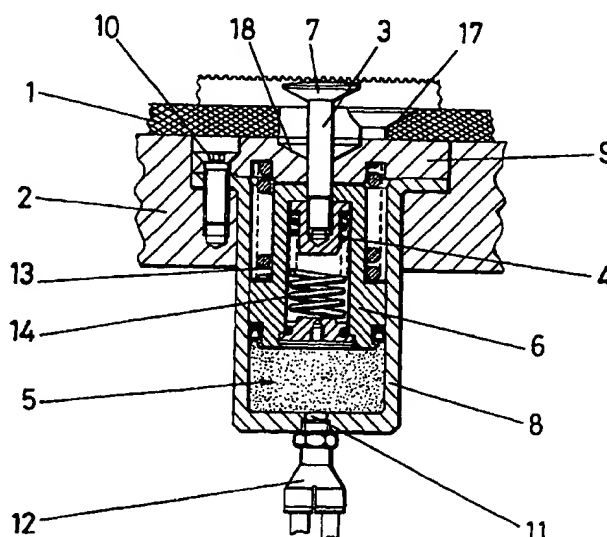
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**(54) SYSTEM FOR FIXING ROTARY CUTTING DIES IN MACHINES FOR DIE CUTTING LAMINAR MATERIAL**

(57) System for fixing rotary die cutters in die cutting machines for cutting laminar material, said system comprising fixing means between the die (1) and a die-holder surface or cylinder (2) around which the die (1) is arranged, wherein the fixing means include a plurality of

bolts (3) actuated by an actuator (5) housed inside a hollow body (8) fixed to the die-holder cylinder (2) in order to provide for a rapid fixing of the rotary die to the die-holder cylinder.



**FIG. 1**

## Description

### PURPOSE

[0001] This descriptive report refers to a system for fixing rotary cutting dies in machines for die cutting laminar material, the purpose of which lies in its configuration as a system that permits fixing rotary cutting dies on the cylinders or cutting die supports in machines for die cutting laminar material.

### SCOPE

[0002] This invention is applied within the industry dedicated to the manufacture of die cutting machines, especially machines for die cutting laminar material.

### HISTORY

[0003] In rotary cutting die machines, the material to be cut, for example cardboard for making boxes, is moved between a cutting die support cylinder and a counter-cutting die cylinder or anvil, also rotary, so that at each turn of the cylinders the cutting die falls on the counter-cutting die and makes a cut or warping on the cardboard.

[0004] To avoid that the cutting die becomes damaged by the blow, the surface of the counter-cutting die is provided with a polyurethane coating.

[0005] At present, the rotary cutting dies are fixed on the cutting die support by means of screws that are coupled to the corresponding screw holes made on the surface of the cutting die support cylinder.

[0006] This fixing system has the main inconvenience that it is excessively slow, as a considerable number of screws has to be placed.

[0007] The statement made in the above paragraph confirms that the stopping time of the machine when a new cutting die has to be mounted is excessive and this affects the productivity of the rotary cutting die machine.

### DESCRIPTION OF THE INVENTION

[0008] The system for fixing rotary cutting dies in machines for die cutting laminar material proposed by the invention is formed in itself as an obvious novelty that manages to resolve the above mentioned inconvenience and, furthermore, presents other advantages to be described later on.

[0009] The system for fixing rotary cutting dies in machines for die cutting laminar material, purpose of this invention, includes fixing means between the cutting die and a cutting die support cylinder, where the fixing means has a number of bolts operated by a driving device.

[0010] This characteristic permits rapid fixing of the rotary cutting die to the cutting die support cylinder, with the result that the shutdown time of the machine to

change the cutting die is less than at present, improving the productivity of the cutting die machine.

[0011] The system of the invention also has the peculiarity that each of the working devices is housed inside a hollow body fixed to the cutting die support cylinder.

[0012] Thanks to this characteristic the manufacturing costs of the cutting die machine are not overexpensive, in turn permitting that maintenance and mechanization of the machine are quick and easy.

[0013] Preferably, the working devices are also dynamic fluid cylinders that operate independently in the two halves of the cutting die support cylinder.

[0014] According to their performance, the dynamic fluid cylinders are pneumatic or hydraulic cylinders and also preferred the working devices are dynamic fluid cylinders that operate independent of the two halves of the cutting die support cylinder.

[0015] Likewise, according to their performance, the dynamic fluid cylinders are pneumatic or hydraulic cylinders and it should be indicated that it is also preferred that the bolts are placed on the rotary cutting die in quincunxes with the result that the bolts occupy the whole surface of the cutting die in a uniform way.

[0016] According to a performance, the system of the invention also includes screwed drill holes to fix the rotary cutting die to the cutting die support cylinder, placing these screwed drill holes to ensure fixing of the rotary cutting die to the cutting die support cylinder in the event the system purpose of this invention is not used.

[0017] Preferably, the drill holes are also placed on the cutting die support cylinder in quincunxes, occupying the places that have not been used by the bolts.

### DESCRIPTION OF THE DRAWINGS

[0018] To complement the description which follows and in order to help with a better understanding of the characteristics of the invention, this descriptive report includes a set of drawings in which the following is represented in an illustrative but not limiting way:

Figure 1 shows an elevated section view of a working device.

Figure 2 shows a view in perspective of a cutting die placed on a cutting die support cylinder.

Figure 3 shows a detail of the centering system of the cutting die on the cutting die support cylinder.

Figure 4 shows a fixing hole of the cutting die.

Figures 5, 6, 7 and 8 correspond to elevated section views of the four working positions of the working device relating to the system for fixing rotary cutting dies in machined for die cutting laminar material,

the purpose of this invention.

## PREFERRED PERFORMANCE OF THE INVENTION

[0019] In view of these figures, it can be seen how the system for fixing rotary cutting dies in machines for die cutting laminar material is made up of rotary cutting dies (1) which are fixed to cutting die support cylinders (2) by means of a number of bolts (3) worked by a pneumatic cylinder (5).

[0020] The bolts (3) are fixed to the piston (6) of the pneumatic cylinder (5) by a screw nut (4) the head (7) of which has a larger diameter that fixes the cutting die (1) to the cutting die support cylinder (2).

[0021] The pneumatic cylinders (5) are housed inside two hollow bodies (8) and each of these hollow bodies (8) is fixed to the cutting die support cylinder (2) by means of four fixing screws (10).

[0022] As can be seen in figure 2, the bolts (3) are placed on cutting die support cylinders (2) and on the rotary cutting die (1) in quincunxes, so that they occupy the whole surface of the cutting die (1) in a uniform way.

[0023] In figure 3 it can be seen that, in order to center the cutting die (1) on the cutting die support cylinder (3), this has a circumferential butt (19) and an axial butt (20) for centering the cutting die (1), whilst the cutting die (1) has a centering guide (21).

[0024] The fixing system can also include screwed drill holes (22) to fix the rotary cutting die (1) to the cutting die support cylinder (2) and, in this case, the screwed drill holes (22) are also placed on the cutting die support cylinder (2) and on the rotary cutting die (1) in quincunxes, occupying the places that have not been previously occupied by the bolts (3).

[0025] At the bottom of each pneumatic cylinder (5) there is an orifice (11) connected to a duct (12) for injecting pressurized air. In the event that the bolt (3) does not find any hole (15) in the cutting die (1) through which it can exit, the system of the invention has a hollow piston (6) that has a spring (14) inside which gives way and permits the bolt (3) to remain hidden inside the piston (6) and in a hollow (18) in the lid (9) of the pneumatic cylinder. This lid (9) is fixed to the cutting die (1) with the same screws (10) as the hollow body (8).

[0026] The holes (15) of the cutting die (1) have a "coliso" (16) provided with an adapter (17) in the shape of the head (7) of the bolt (3).

[0027] The different work stages of the working devices can be seen in figure 5.

[0028] The above mentioned stages of the working devices are as follows:

[0029] First stage - Whilst the pneumatic cylinder (figure 5) has no pressurized air, the spring (13) pushes the bolt (3) towards the inside of the hollow body (8). The cutting die (1) is placed on the cutting die support cylinder (2), butting against the circumferential butt (19) and the centering axial butt (20) of the cutting die support cylinder (2).

[0030] Second stage - The pneumatic cylinder, as shown in figures 6 and 7, receives the pressurized air through an orifice (1) made at the bottom of the pneumatic cylinder (5), connected to a duct (12), driving this pressurized air upwards to the piston (6) and, at the same, the bolt (3), thus overcoming the stress of the spring (13), as shown in figure 7.

[0031] In the hypothetical case that the outlet of the bolt (3) was obstructed, the pressurized air would continue to overcome the stress of the spring (13), thus maintaining the piston up, but the bolt (3) would remain hidden inside the piston (6), thus placing small pressure produced by the spring (14) on the cutting die (1), as shown in figure 6.

[0032] Third stage - In this stage the cutting die (1) must be moved axially towards the position of the "coliso" (16) and then eliminate the pressurized air from inside the pneumatic cylinder, thus obtaining that the spring (13) works and in this way moves the piston (6) and the bolt (3) towards the inside of the cutting die support cylinder (2), thus fixing the head (7) of the bolt (3) and the cutting die (1) to the cutting die support cylinder (2), as shown in figure 8.

## Claims

1. System for fixing rotary cutting dies in machines for die cutting laminar material that includes means for fixing the cutting die (1) and a cutting die support cylinder or surface (2) around which the cutting die (1) is arranged, characterized by the fact that the fixing means include a number of bolts (3) operated by a working device (5) housed inside a hollow body (6) fixed to the cutting die support cylinder (2).
2. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the first claim, characterized by the fact that the bolts (3) have an area with a larger diameter in the head that fixes the cutting die (1) to the cutting die support cylinder (2).
3. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the first claim, characterized by the fact that the working devices (5) are dynamic fluid cylinders that operate independently in the two halves of 180° of the cutting die support cylinder (2), in the event the cutting die (1) is rotary.
4. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the third claim, characterized by the fact that the dynamic fluid cylinders (5) are pneumatic or hydraulic cylinders.
5. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the first

claim, characterized by the fact that the bolts (3) are placed on the rotary cylinder or on a flat surface in quincunxes.

6. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the first claim, characterized by the fact that it is provided with screwed drill holes (22) for fixing the rotary cutting die (1) to the cutting die support cylinder (2). 5  
10
7. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the fifth and sixth claims, characterized by the fact that the drill holes (22) are also placed on the rotary cutting die (1) in quincunxes, occupying the places not occupied by the bolts (3). 15
8. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the above claims, characterized by the fact that it has springs (13) and (14) which work on the bolt (3) so that it remains inside the hollow piston (6) when the outlet of the bolt (3) is obstructed by the cutting die (1). 20
9. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the above claims, characterized by the fact that the cutting die (1) is centered on the cutting die support cylinder (2). 25  
30
10. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the ninth claim, characterized by the fact that it has a circumferential butt (19) and an axial butt (20) in the cutting die support cylinder (2), and a centering guide (21) in the cutting die (1). 35
11. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the above claims, characterized by the fact that it is a hole (15) with a "coliso" (16) and an adapter (17) made in the wood of the cutting die so that, after having moved the wood and eliminated the air from the pneumatic cylinder (5), the head (7) of the bolt (3) fixes the cutting die (1) against the cutting die support cylinder (2). 40  
45

50

55

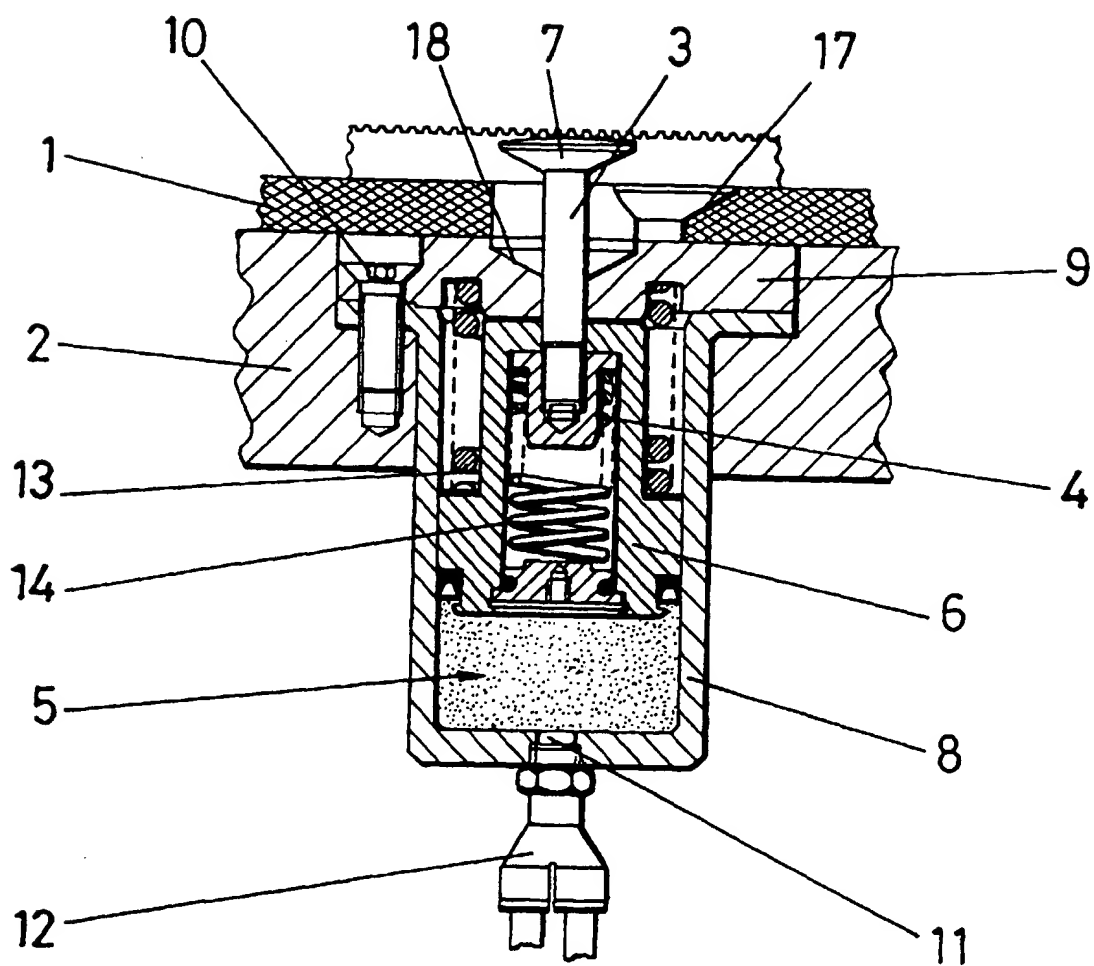
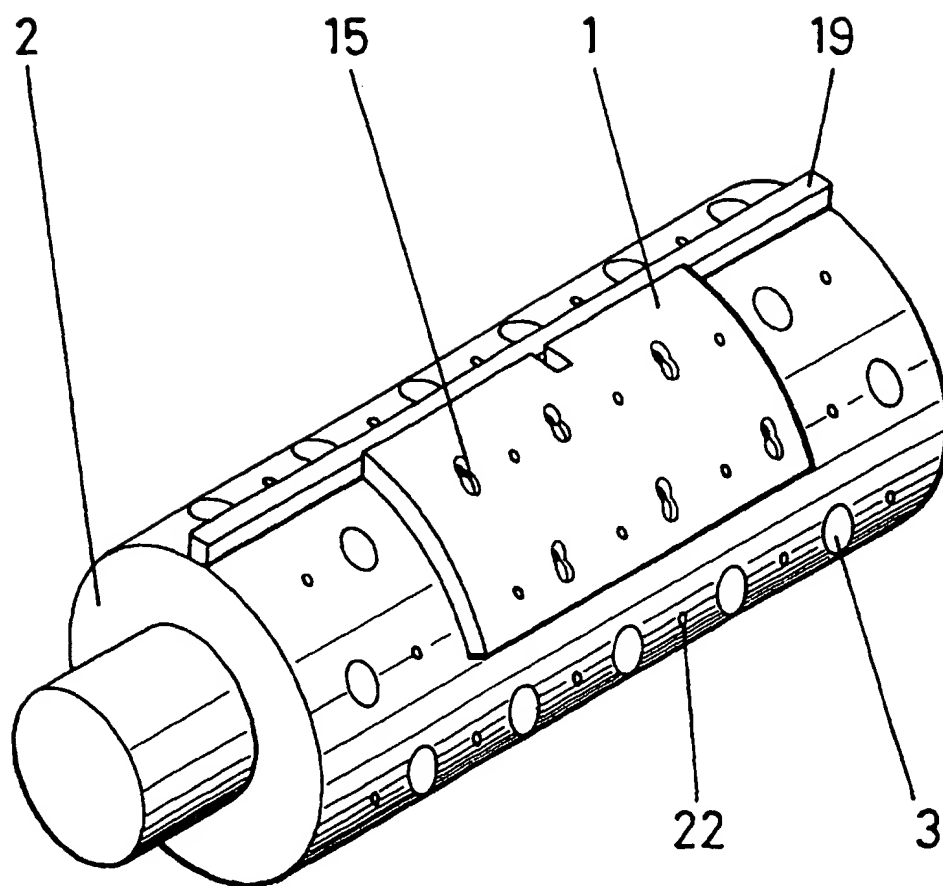


FIG. 1



**FIG. 2**

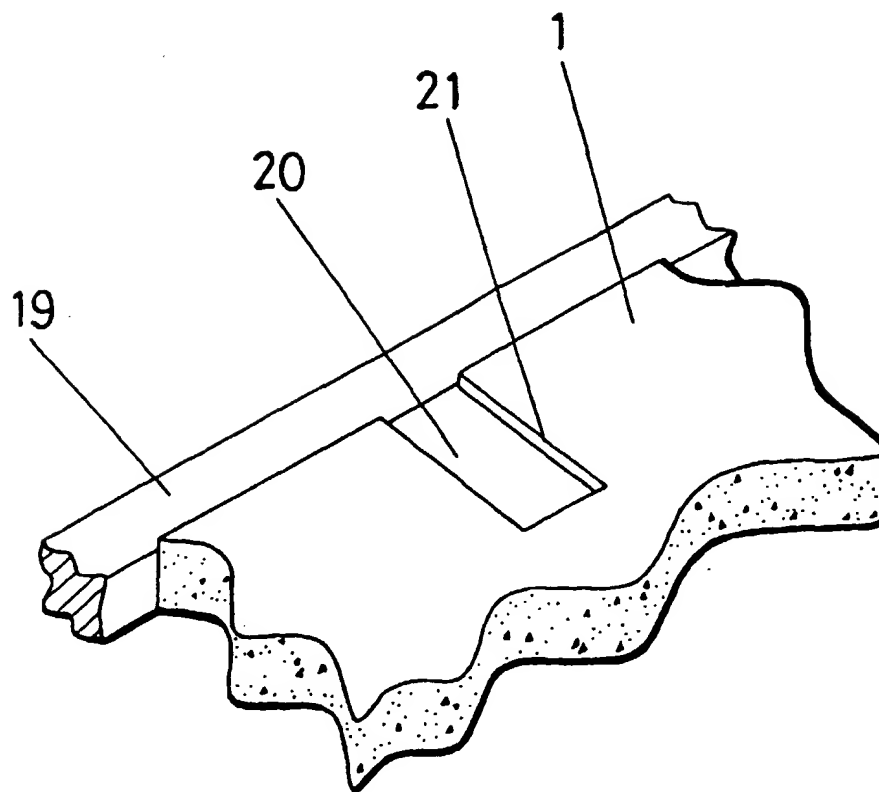


FIG. 3

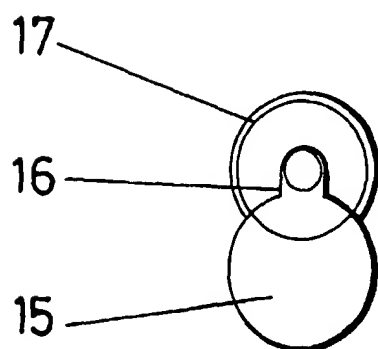


FIG. 4



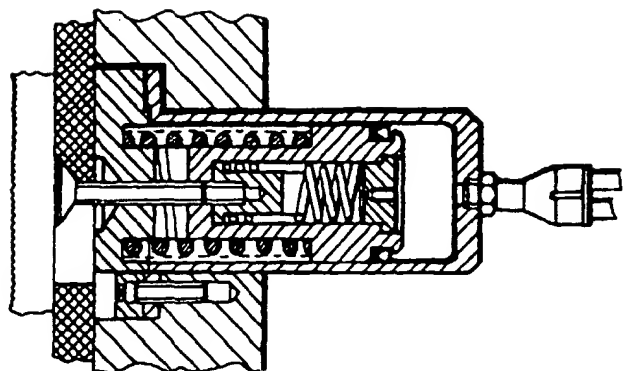


FIG. 8

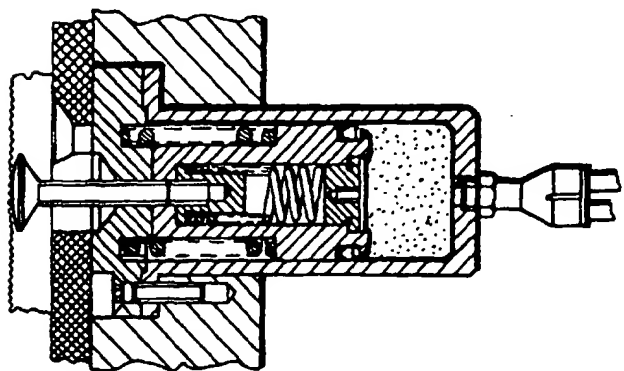


FIG. 7

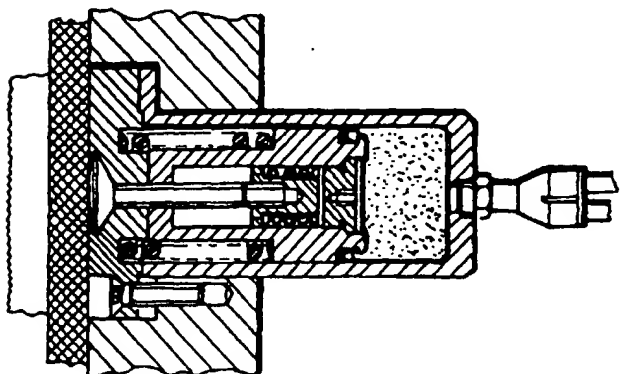


FIG. 6

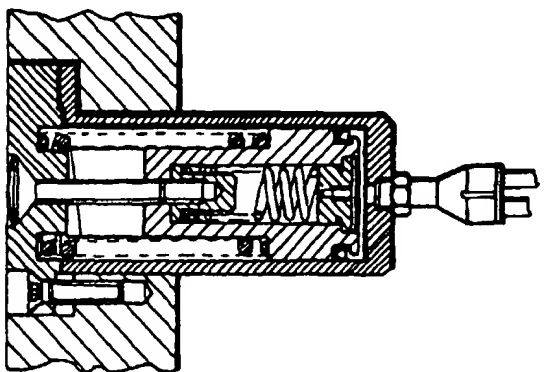


FIG. 5

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/ES 99/00157A. CLASSIFICATION OF SUBJECT MATTER<sup>6</sup>:

IPC6: B26D 7/26, B26F 1/44

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B26D 7/26, B26F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, PAJ, WPI, CIBEPAT

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ES-2120320-A1 (CIMCOSA) 16 October 1998 (16.10.98), claims 1-9, figures 1-4.	1-5
E	ES-2130912-A1 (CIMCOSA) 1 July 1999 (01.07.99), column 2, lines 9-60; figure 1.	1-4
A	US-4815343-A (SOFINOWSKI) 28 March 1989 (28.03.89), column 3, line 10 - column 5, line 48; figures 1-8.	1, 2, 6, 9
A	GB-861169-A (SCHNELLPRESSENFABRIK FRANKENTHAL ALBERT & CIE AKTIENGESSELLSCHAFT), 15 february 1961 (15.02.61), page 2, line 98 - page 3, line 37; figures 6 and 7.	1,2



Further documents are listed in the continuation of Box C.



See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search  
23 September 1999 (23.09.99)Date of mailing of the international search report  
24 September 1999 (24.09.99)

Name and mailing address of the ISA/

Authorized officer

Facsimile No. S.P.T.O.

Telephone No.

**INTERNATIONAL SEARCH REPORT**  
 Information on patent family members

International Application No

**PCT/ ES 99/00157**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
ES-2120320-A1 (CIMCOSA)	16.10.1998	ES-2130912-A WO-9626049-A	01.07.1999 29.08.1996
ES-2130912-A1 (CIMCOSA)	01.07.1999	ES-2120320-A WO-9626049-A	16.10.1998 29.08.1996
US-4815343-A (SOFINOWSKI)	28.03.1989	NONE	
GB-861169-A (SCHNELLPRESSENFABRIK)	15.02.1961	NONE	

(12)

(21) 2 298 672

(22) 28.05.1999

(51) Int. Cl. 7: **B26D 007/26, B26F 001/44**

(85) 31.01.2000

(86) PCT/ES99/00157

(87) WO99/62778

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(54) SYSTÈME DE FIXATION DE MATRICES ROTATIVES DANS DES DECOUPEUSES DE MATERIAU STRATIFIE  
(54) SYSTEM FOR FIXING ROTARY CUTTING DIES IN MACHINES FOR DIE CUTTING LAMINAR MATERIAL

(57)

System for fixing rotary die cutters in die cutting machines for cutting laminar material, said system comprising fixing means between the die (1) and a die-holder surface or cylinder (2) around which the die (1) is arranged, wherein the fixing means include a plurality of bolts (3) actuated by an actuator (5) housed inside a hollow body (8) fixed to the die-holder cylinder (2) in order to provide for a rapid fixing of the rotary die to the die-holder cylinder.



(72) SERRA OBIOL, RAMON, ES

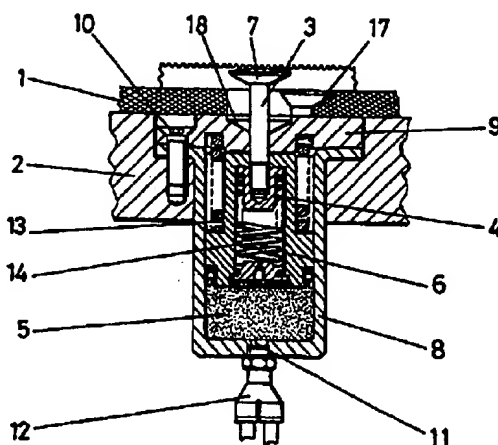
(71) COMERCIAL INDUSTRIAL MAQUINARIA CARTON ONDULADO,  
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(51) Int. Cl.<sup>7</sup> B26D 7/26, B26F 1/44

(30) 1998/06/01 (P 9801136) ES

(54) **SYSTEME DE FIXATION DE MATRICES ROTATIVES DANS  
DES DECOUPEUSES DE MATERIAU STRATIFIE**

(54) **SYSTEM FOR FIXING ROTARY CUTTING DIES IN MACHINES  
FOR DIE CUTTING LAMINAR MATERIAL**



(57) L'invention concerne un système de fixation de matrices rotatives dans des découpeuses de matériau stratifié qui est équipé de moyens de fixation placés entre la matrice (1) et un cylindre ou surface porte-matrice (2), autour duquel est disposée la matrice (1). Les moyens de fixation comprennent une pluralité de goujons (3) actionnés par un dispositif de commande (5) logé à l'intérieur d'un corps creux (8) fixé au cylindre porte-matrice (2), ce qui permet de fixer rapidement la matrice rotative au cylindre porte-matrice.

(57) System for fixing rotary die cutters in die cutting machines for cutting laminar material, said system comprising fixing means between the die (1) and a die-holder surface or cylinder (2) around which the die (1) is arranged, wherein the fixing means include a plurality of bolts (3) actuated by an actuator (5) housed inside a hollow body (8) fixed to the die-holder cylinder (2) in order to provide for a rapid fixing of the rotary die to the die-holder cylinder.

VERSION  
CORREGIDA\*



**PCT**  
ORGANIZACION MUNDIAL DE LA PROPIEDAD INTELECTUAL  
Oficina Internacional  
SOLICITUD INTERNACIONAL PUBLICADA EN VIRTUD DEL TRATADO DE COOPERACION  
EN MATERIA DE PATENTES (PCT)

<p>(51) Clasificación Internacional de Patentes<sup>6</sup> : <b>B26D 7/26, B26F 1/44</b></p>	<p><b>A1</b></p>	<p>(11) Número de publicación internacional: <b>WO 99/62778</b> (43) Fecha de publicación internacional: 9 de Diciembre de 1999 (09.12.99)</p>
<p>(21) Solicitud internacional: PCT/ES99/00157 (22) Fecha de la presentación internacional: 28 de Mayo de 1999 (28.05.99) (30) Datos relativos a la prioridad: P 9801136 1 de Junio de 1998 (01.06.98) ES (71) Solicitante (para todos los Estados designados salvo US): COMERCIAL INDUSTRIAL MAQUINARIA CARTON ONDULADO, S.A. (CIMCOSA) [ES/ES]; Avenida Conde Llobregat, 48, E-08760 Martorell (ES). (72) Inventor; e (75) Inventor/solicitante (sólo US): SERRA OBIOL, Ramón [ES/ES]; Avenida Conde Llobregat, 48, E-08760 Martorell (ES). (74) Mandatario: DOMINGUEZ COBETA, Josefa; Calle Santa Virgilia, 12, E-28033 Madrid (ES).</p>		<p>(81) Estados designados: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, Patente europea (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  Publicada Con informe de búsqueda internacional. Antes de la expiración del plazo previsto para la modificación de las reivindicaciones, será publicada nuevamente si se reciben modificaciones.</p>

(54) Title: SYSTEM FOR FIXING ROTARY CUTTING DIES IN MACHINES FOR DIE CUTTING LAMINAR MATERIAL

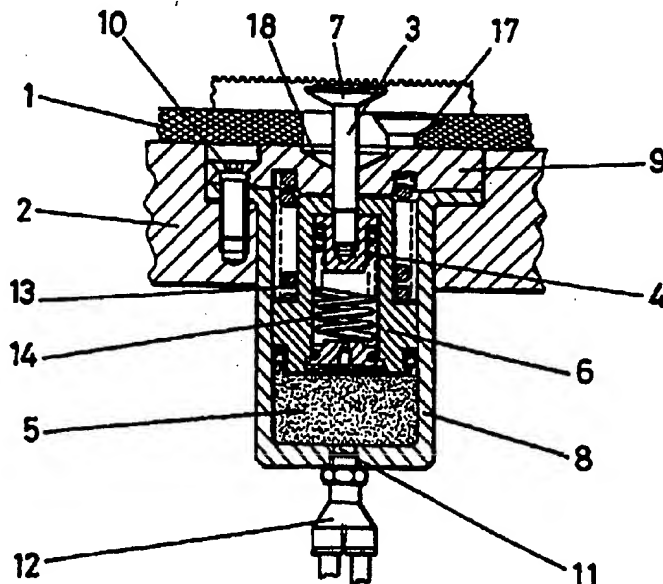
(54) Título: SISTEMA PARA LA SUJECION DE TROQUELES ROTATIVOS EN MAQUINAS TROQUELADORAS DE MATERIAL LAMINAR

(57) Abstract

System for fixing rotary die cutters in die cutting machines for cutting laminar material, said system comprising fixing means between the die (1) and a die-holder surface or cylinder (2) around which the die (1) is arranged, wherein the fixing means include a plurality of bolts (3) actuated by an actuator (5) housed inside a hollow body (8) fixed to the die-holder cylinder (2) in order to provide for a rapid fixing of the rotary die to the die-holder cylinder.

(57) Resumen

Sistema para la sujeción de troqueles rotativos en máquinas troqueladoras de material laminar, que consiste en unos medios de sujeción entre el troquel (1) y un cilindro o superficie porta-troquel (2), alrededor del cual está dispuesto el troquel (1), en el que los medios de sujeción comprenden una pluralidad de pernos (3) accionados por un dispositivo accionador (5), alojado en el interior de un cuerpo hueco (8) sujeto al cilindro porta-troquel (2), consiguiendo una rápida sujeción del troquel rotativo al cilindro porta-troquel.



SYSTEM FOR FIXING ROTARY CUTTING DIES IN  
MACHINES FOR DIE CUTTING LAMINAR MATERIAL

5

DESCRIPTION

PURPOSE

10        This descriptive report refers to a system for  
fixing rotary cutting dies in machines for die cutting  
laminar material, the purpose of which lies in its  
configuration as a system that permits fixing rotary  
cutting dies on the cylinders or cutting die supports  
15 in machines for die cutting laminar material.

SCOPE

20        This invention is applied within the industry  
dedicated to the manufacture of die cutting machines,  
especially machines for die cutting laminar material.

HISTORY

25        In rotary cutting die machines, the material to  
be cut, for example cardboard for making boxes, is  
moved between a cutting die support cylinder and a  
counter-cutting die cylinder or anvil, also rotary, so  
that at each turn of the cylinders the cutting die  
30 falls on the counter-cutting die and makes a cut or  
warping on the cardboard.

To avoid that the cutting die becomes damaged by  
the blow, the surface of the counter-cutting die is  
35 provided with a polyurethane coating.

At present, the rotary cutting dies are fixed on the cutting die support by means of screws that are coupled to the corresponding screw holes made on the surface of the cutting die support cylinder.

This fixing system has the main inconvenience that it is excessively slow, as a considerable number of screws has to be placed.

10

The statement made in the above paragraph confirms that the stopping time of the machine when a new cutting die has to be mounted is excessive and this affects the productivity of the rotary cutting die machine.

15

#### DESCRIPTION OF THE INVENTION

The system for fixing rotary cutting dies in machines for die cutting laminar material proposed by the invention is formed in itself as an obvious novelty that manages to resolve the above mentioned inconvenience and, furthermore, presents other advantages to be described later on.

25

The system for fixing rotary cutting dies in machines for die cutting laminar material, purpose of this invention, includes fixing means between the cutting die and a cutting die support cylinder, where the fixing means has a number of bolts operated by a driving device.

30

This characteristic permits rapid fixing of the rotary cutting die to the cutting die support cylinder, with the result that the shutdown time of the machine to change the cutting die is less than at

35



present, improving the productivity of the cutting die machine.

5 The system of the invention also has the peculiarity that each of the working devices is housed inside a hollow body fixed to the cutting die support cylinder.

10 Thanks to this characteristic the manufacturing costs of the cutting die machine are not overexpensive, in turn permitting that maintenance and mechanization of the machine are quick and easy.

15 Preferably, the working devices are also dynamic fluid cylinders that operate independently in the two halves of the cutting die support cylinder.

20 According to their performance, the dynamic fluid cylinders are pneumatic or hydraulic cylinders and also preferred the working devices are dynamic fluid cylinders that operate independent of the two halves of the cutting die support cylinder.

25 Likewise, according to their performance, the dynamic fluid cylinders are pneumatic or hydraulic cylinders and it should be indicated that it is also preferred that the bolts are placed on the rotary cutting die in quincunxes with the result that the bolts occupy the whole surface of the cutting die in a  
30 uniform way.

According to a performance, the system of the invention also includes screwed drill holes to fix the rotary cutting die to the cutting die support  
35 cylinder, placing these screwed drill holes to ensure fixing of the rotary cutting die to the cutting die

support cylinder in the event the system purpose of this invention is not used.

Preferably, the drill holes are also placed on  
5 the cutting die support cylinder in quincunxes, occupying the places that have not been used by the bolts.

#### DESCRIPTION OF THE DRAWINGS

10

To complement the description which follows and in order to help with a better understanding of the characteristics of the invention, this descriptive report includes a set of drawings in which the  
15 following is represented in an illustrative but not limiting way:

Figure 1 shows an elevated section view of a working device.

20

Figure 2 shows a view in perspective of a cutting die placed on a cutting die support cylinder.

Figure 3 shows a detail of the centering system  
25 of the cutting die on the cutting die support cylinder.

Figure 4 shows a fixing hole of the cutting die.

30

Figures 5, 6, 7 and 8 correspond to elevated section views of the four working positions of the working device relating to the system for fixing rotary cutting dies in machined for die cutting laminar material, the purpose of this invention.

35

support cylinder in the event the system purpose of this invention is not used.

5 Preferably, the drill holes are also placed on the cutting die support cylinder in quincunxes, occupying the places that have not been used by the bolts.

#### DESCRIPTION OF THE DRAWINGS

10

To complement the description which follows and in order to help with a better understanding of the characteristics of the invention, this descriptive report includes a set of drawings in which the following is represented in an illustrative but not limiting way:

Figure 1 shows an elevated section view of a working device.

20

Figure 2 shows a view in perspective of a cutting die placed on a cutting die support cylinder.

Figure 3 shows a detail of the centering system of the cutting die on the cutting die support cylinder.

25

Figure 4 shows a fixing hole of the cutting die.

30

Figures 5, 6, 7 and 8 correspond to elevated section views of the four working positions of the working device relating to the system for fixing rotary cutting dies in machined for die cutting laminar material, the purpose of this invention.

35

the screwed drill holes (22) are also placed on the cutting die support cylinder (2) and on the rotary cutting die (1) in quincunxes, occupying the places that have not been previously occupied by the bolts (3).

At the bottom of each pneumatic cylinder (5) there is an orifice (11) connected to a duct (12) for injecting pressurized air. In the event that the bolt (3) does not find any hole (15) in the cutting die (1) through which it can exit, the system of the invention has a hollow piston (6) that has a spring (14) inside which gives way and permits the bolt (3) to remain hidden inside the piston (6) and in a hollow (18) in the lid (9) of the pneumatic cylinder. This lid (9) is fixed to the cutting die (1) with the same screws (10) as the hollow body (8).

The holes (15) of the cutting die (1) have a "coliso" (16) provided with an adapter (17) in the shape of the head (7) of the bolt (3).

The different work stages of the working devices can be seen in figure 5.

The above mentioned stages of the working devices are as follows:

First stage - Whilst the pneumatic cylinder (figure 5) has no pressurized air, the spring (13) pushes the bolt (3) towards the inside of the hollow body (8). The cutting die (1) is placed on the cutting die support cylinder (2), butting against the circumferential butt (19) and the centering axial butt (20) of the cutting die support cylinder (2).

Second stage - The pneumatic cylinder, as shown in figures 6 and 7, receives the pressurized air through an orifice (1) made at the bottom of the pneumatic cylinder (5), connected to a duct (12), driving this pressurized air upwards to the piston (6) and, at the same, the bolt (3), thus overcoming the stress of the spring (13), as shown in figure 7.

10 In the hypothetical case that the outlet of the bolt (3) was obstructed, the pressurized air would continue to overcome the stress of the spring (13), thus maintaining the piston up, but the bolt (3) would remain hidden inside the piston (6), thus placing  
15 small pressure produced by the spring (14) on the cutting die (1), as shown in figure 6.

Third stage - In this stage the cutting die (1) must be moved axially towards the position of the  
20 "coliso" (16) and then eliminate the pressurized air from inside the pneumatic cylinder, thus obtaining that the spring (13) works and in this way moves the piston (6) and the bolt (3) towards the inside of the cutting die support cylinder (2), thus fixing the head  
25 (7) of the bolt (3) and the cutting die (1) to the cutting die support cylinder (2), as shown in figure 8.

30

35

CLAIMS

1. System for fixing rotary cutting dies in  
5 machines for die cutting laminar material that  
includes means for fixing the cutting die (1) and a  
cutting die support cylinder or surface (2) around  
which the cutting die (1) is arranged, characterized  
by the fact that the fixing means include a number of  
10 bolts (3) operated by a working device (5) housed  
inside a hollow body (6) fixed to the cutting die  
support cylinder (2).

2. System for fixing rotary cutting dies in  
15 machines for die cutting laminar material, according  
to the first claim, characterized by the fact that the  
bolts (3) have an area with a larger diameter in the  
head that fixes the cutting die (1) to the cutting die  
support cylinder (2).

20 3. System for fixing rotary cutting dies in  
machines for die cutting laminar material, according  
to the first claim, characterized by the fact that the  
working devices (5) are dynamic fluid cylinders that  
25 operate independently in the two halves of 180° of the  
cutting die support cylinder (2), in the event the  
cutting die (1) is rotary.

30 4. System for fixing rotary cutting dies in  
machines for die cutting laminar material, according  
to the third claim, characterized by the fact that the  
dynamic fluid cylinders (5) are pneumatic or hydraulic  
cylinders.

35 5. System for fixing rotary cutting dies in  
machines for die cutting laminar material, according

to the first claim, characterized by the fact that the bolts (3) are placed on the rotary cylinder or on a flat surface in quincunxes.

5        6.System for fixing rotary cutting dies in machines for die cutting laminar material, according to the first claim, characterized by the fact that it is provided with screwed drill holes (22) for fixing the rotary cutting die (1) to the cutting die support  
10 cylinder (2).

7.System for fixing rotary cutting dies in machines for die cutting laminar material, according to the fifth and sixth claims, characterized by the  
15 fact that the drill holes (22) are also placed on the rotary cutting die (1) in quincunxes, occupying the places not occupied by the bolts (3).

8.System for fixing rotary cutting dies in  
20 machines for die cutting laminar material, according to the above claims, characterized by the fact that it has springs (13) and (14) which work on the bolt (3) so that it remains inside the hollow piston (6) when the outlet of the bolt (3) is obstructed by the  
25 cutting die (1).

9.System for fixing rotary cutting dies in machines for die cutting laminar material, according to the above claims, characterized by the fact that  
30 the cutting die (1) is centered on the cutting die support cylinder (2).

10.System for fixing rotary cutting dies in machines for die cutting laminar material, according  
35 to the ninth claim, characterized by the fact that it has a circumferential butt (19) and an axial butt (20)

10

in the cutting die support cylinder (2), and a centering guide (21) in the cutting die (1).

5        11. System for fixing rotary cutting dies in machines for die cutting laminar material, according to the above claims, characterized by the fact that it is a hole (15) with a "coliso" (16) and an adapter (17) made in the wood of the cutting die so that,  
10 after having moved the wood and eliminated the air from the pneumatic cylinder (5), the head (7) of the bolt (3) fixes the cutting die (1) against the cutting die support cylinder (2).

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1/4

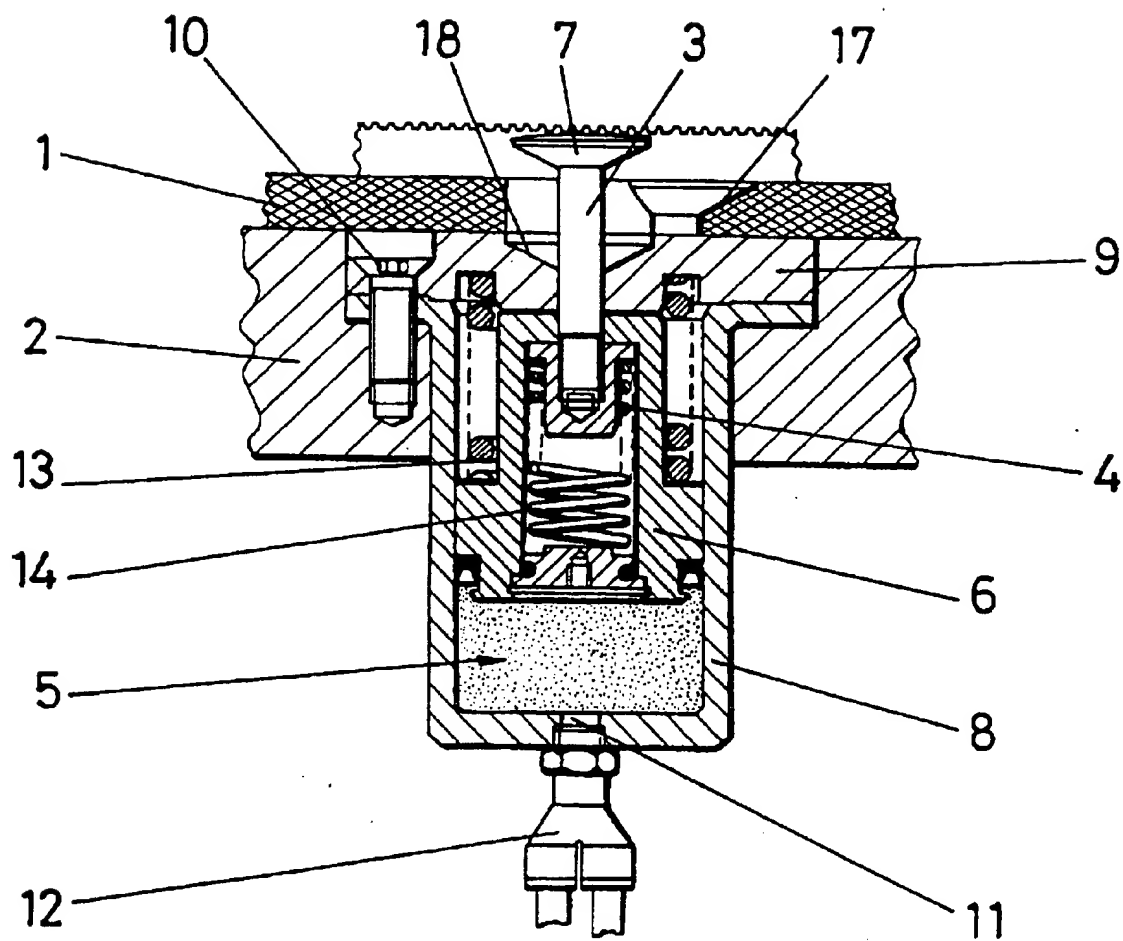


FIG. 1

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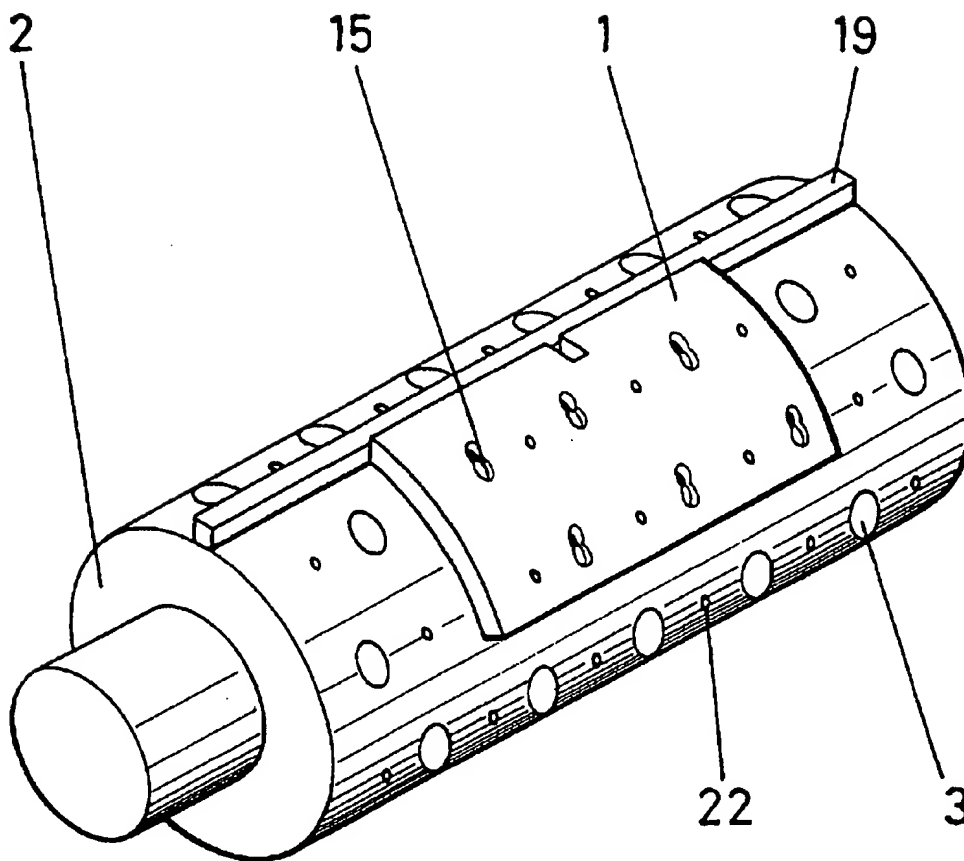


FIG. 2

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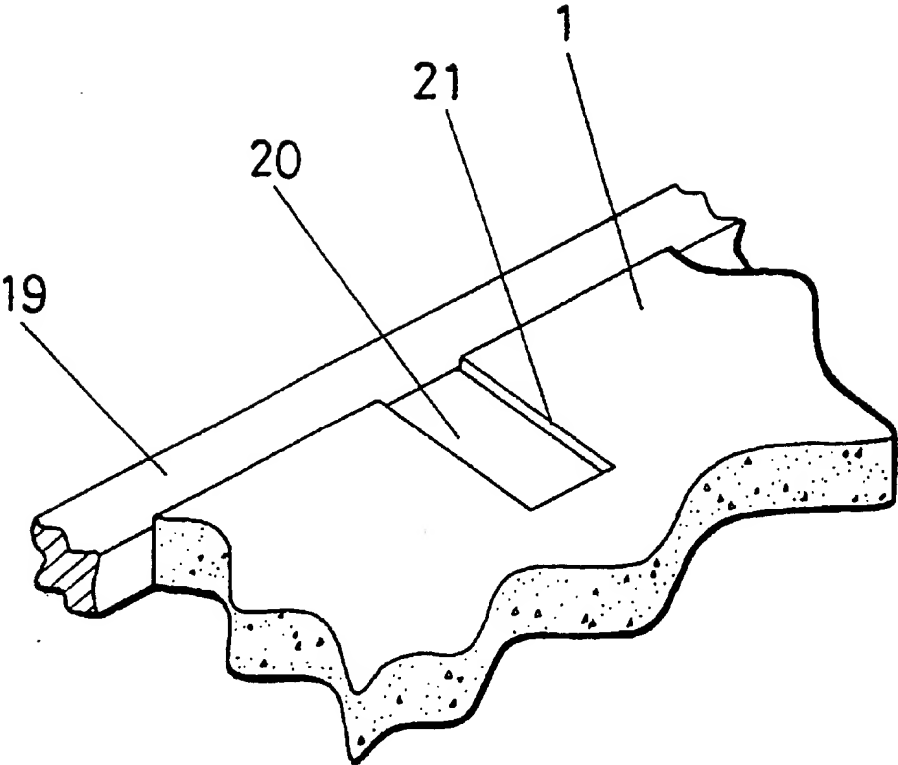


FIG. 3

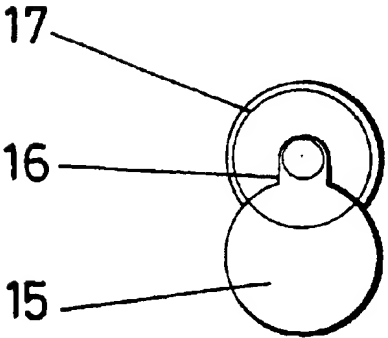


FIG. 4

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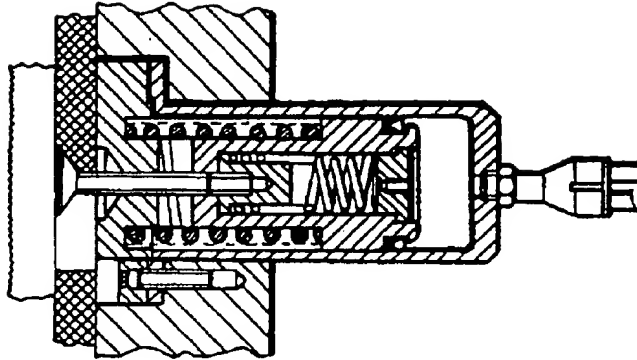


FIG. 8

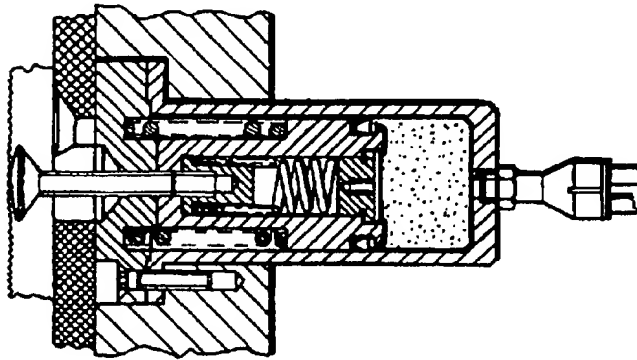


FIG. 7

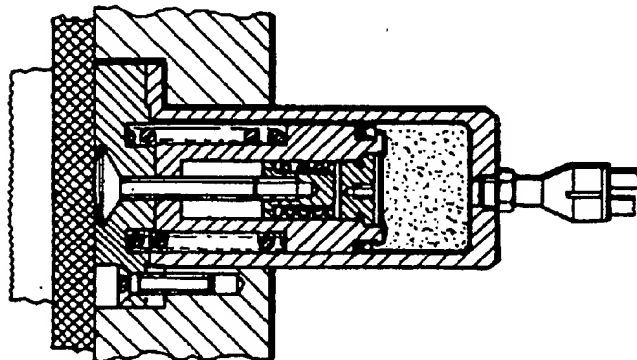


FIG. 6

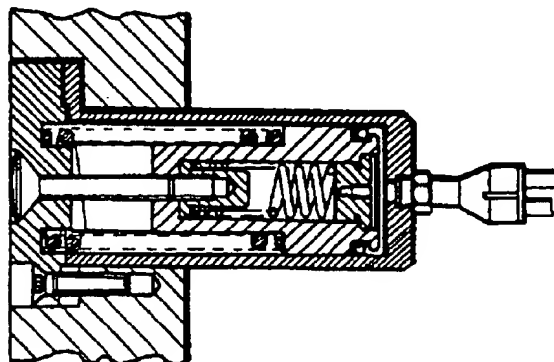


FIG. 5

## RELATED PROCEEDINGS APPENDIX

Not Applicable.

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